WEST Search History

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DATE: Friday, July 09, 2004

Hide?	Set Name	Query	Hit Count
		DB=USPT,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR	
☐	L7	L6 and l4	18
☐	L6	(bi near2 phase)	3154
☐	L5	L4 and l3	0
☐	L4	(375/132.ccls. or 375/133.ccls. or 375/134.ccls. or 375/135.ccls. or 375/136.ccls.)	528
☐	L3	(bi near2 phase near2 (mark or space))	151
☐	L2	(bi near2 phase near2 (mark or space)) and (frequenc$3 near2 hop$4)	1
☐	L1	(bi near2 phase near2 (mark or space)) same (frequenc$3 near2 hop$4)	0

END OF SEARCH HISTORY

L7: Entry 8 of 18 File: USPT Feb 9, 1999

DOCUMENT-IDENTIFIER: US 5870426 A
TITLE: Grouping of spread spectrum acknowledgement pagers to minimize transmission collisions

Abstract Text (1):
An acknowledgment paging system is described which fits within the existing infrastructure of a paging network and which provides low cost manufacture and low power operation while still enabling the acknowledgment paging over long distances. The acknowledgment paging system consists of a standard paging transmitter and a plurality of remote paging units which respond to a page using frequency-hopped spread-spectrum differential bi-phase shift keying communications. The plurality of pagers are assigned to groups with each group being assigned a separate starting location in a common, repeating pseudo-random noise code which determines the frequency hops. The grouping of pagers minimizes the collisions of acknowledgment transmissions between groups and the enables a large number of paging units to operate within a single geographic area.

Brief Summary Text (23):
In particular, the present invention describes an acknowledgement paging system in which the remote paging unit responds to a request using frequency-hopped spread-spectrum differential bi-phase shift keying communications. A plurality of pagers are assigned to groups with each group being assigned a separate starting location in a common, repeating pseudo-random noise code which determines the frequency hops. The grouping of pagers minimizes the collisions of acknowledgment transmissions between groups and enables a large number of paging units to operate within a single geographic area. The pagers include a special double loop PLL synthesizer to produce accurate narrow frequencies and hop frequencies in a rapid fashion.

Brief Summary Text (24):
The present invention also describes algorithms for retrieving very low power acknowledgement paging messages in a noisy environment by using data redundancy, data interleaving, soft decoding and error correction codes to strip the bi-phase-modulated, frequency-hopped spread-spectrum digital data transmitted from the remote pocket pagers. A history of the frequency and phase drift is used during reception of the acknowledgement messages to predict the phase and frequency drift of the encoded digital information to further reduce decoding error. Signal to noise ratios are determined for each frequency hop and relatively noisy hops are discarded or minimized in a soft decoding process based redundancy of data bits.

Detailed Description Text (23):
The actual transmission of information from the reverse paging terminals is done using Differential Bi-Phase Shift Keying (DBPSK) modulation on a frequency hopped carrier. Typically a single transmission consists of 53 hops or 53 changed frequencies selected from a list of narrow band frequencies. The frequency selection is based on a pseudo-random noise code list pointing to the frequency selection list. The synchronization information tells the pager where along the pseudo random noise code it should be synchronized for transmission of its message and the fine synchronization information tells exactly the time of day so that the

pager knows exactly when to start transmitting the specific frequency so that the reverse paging terminal 200 is looking for that frequency at the same time.

Detailed Description Text (28):
The acknowledgement signal sent from the reverse pager 144 to the reverse paging terminal 200 of the base station is a spread-spectrum, frequency-hopped transmission using differential bi-phase shift keying (DBPSK) modulation on the frequency-hopped carrier to transmit digital information. The frequency hops are relatively slow, the frequencies transmitted are very narrow and the transmission power is extremely small. The maximum peak output power of transmission from pager 114 is limited to less than one watt to allow use of the 902-928 MHz band in the United States without the need for licensing the paging transmitters as allowed by FCC regulations defined in 47 C.F.R. .sctn.15.247, which is hereby incorporated by reference. Those skilled in the art will readily recognize that other frequency bands and transmissions power levels may be employed depending upon FCC licensing requirements or other frequency licensing requirements of other nationalities.

Detailed Description Text (33):
The message preamble consists only of alternating ones and zeros to get the attention of the base unit receiver to begin synchronizing its FFT (Fast Fourier Transform) routines to begin pulling the message out of the noise. The preamble consists of 165 bits transmitted across 5 hops, that is, transmitted using DBPSK (Differential Bi-Phase Shift Keying) on five different frequencies selected from the frequency list with the specific frequencies selected based on the PN (Pseudo-random Noise) Code list stored within the reverse pager. The sequence location within the PN code that the reverse pager will begin to follow is based on the synchronized time of day. Within a single hop (a single carrier frequency), the carrier phase is alternated 33 times to encode the alternating one-zero pattern.

Detailed Description Text (43):
A single frequency hop is shown in Table 3. The 15 millisecond guard time preceding each hop is primarily a settling time for the oscillator circuits of the reverse pagers to allow the internal oscillator circuit to lock onto the new frequency between hops. Each hop is transmitted at a single frequency in which the phase of the carrier is either at 0 degrees phase or 180 degrees phase in reference to the phase of the reference bit immediately following the quiet or guard time. Thus the first bit is a phase reference bit followed by 32 data bits exhibiting either zero phase shift or 180 degree phase shift to encode the data bits as DBPSK (Differential Bi-Phase Shift Keying).

Detailed Description Text (116):
A key to ensuring that the transmitted frequency is extremely narrow and lies within the selected 7.5 kilohertz channel frequency of the selected hop, a special double loop phase lock loop digital synthesizer is shown in FIG. 19. Because differential bi-phase shift keying is required for transmission, phase noise of the generated frequency must be kept to a minimum. In addition, the lock time of the PLL must be fast to allow rapid hopping between frequencies. The new hop frequency selected by the double loop PLL must settle and generate a clean, narrow skirt frequency within the 15 millisecond guard band shown in Table 3 for a single frequency hop. The phase noise of the frequency transmitted across a single hop for the 32 bits plus reference bit must be kept at a minimum to ensure proper decoding of the 180.degree. phase shift between bits indicating digital zero and one.

Current US Original Classification (1):
375/133

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L7: Entry 9 of 18 File: USPT Apr 7, 1998

DOCUMENT-IDENTIFIER: US 5737358 A
TITLE: Multiplexed radio communication system

Brief Summary Text (19):
Application WO 92/00639 discloses that information communicated on the cellular-to-mobile link channels are encoded, interleaved, bi-phase (BPSK) modulated with orthogonal covering of each BPSK symbol along with quadrature phase shift key (QPSK) spreading of the covered symbols.

Current US Original Classification (1):
375/133

L7: Entry 13 of 18 File: USPT Mar 12, 1996

DOCUMENT-IDENTIFIER: US 5499266 A
TITLE: Low-power frequency-hopped spread spectrum acknowledgement paging system

Abstract Text (1):
An acknowledgement paging system is described which fits within the existing infrastructure of a paging network and which provides low cost manufacture and low power operation while still enabling the acknowledgement paging over long distances. The acknowledgement paging system consists of a standard paging transmitter and a plurality of remote paging units which respond to a page using frequency-hopped spread-spectrum differential bi-phase shift keying communications. The plurality of pagers are assigned to groups with each group being assigned a separate starting location in a common, repeating pseudo-random noise code which determines the frequency hops. The grouping of pagers minimizes the collisions of acknowledgment transmissions between groups and the enables a large number of paging units to operate within a single geographic area. The pagers include a special double loop PLL synthesizer to produce an accurate narrow band frequency and to change or hop frequencies in a rapid fashion. The base receiving unit employs special algorithms for retrieving very low power acknowledgement paging messages in a noisy environment by using data redundancy, data interleaving, soft decoding and error correction codes to strip the bi-phase-modulated, frequency-hopped spread-spectrum digital data transmitted from the remote pocket pagers. A history of the frequency and phase drift is used during reception of the acknowledgement messages to predict the phase and frequency drift of the encoded digital information to further reduce decoding error. Signal to noise ratios are determined for each frequency hop and relatively noisy hops are discarded or minimized in a soft decoding process based redundancy of data bits.

Brief Summary Text (23):
In particular, the present invention describes an acknowledgement paging system in which the remote paging unit responds to a request using frequency-hopped spread-spectrum differential bi-phase shift keying communications. A plurality of pagers are assigned to groups with each group being assigned a separate starting location in a common, repeating pseudo-random noise code which determines the frequency hops. The grouping of pagers minimizes the collisions of acknowledgment transmissions between groups and enables a large number of paging units to operate within a single geographic area. The pagers include a special double loop PLL synthesizer to produce accurate narrow frequencies and hop frequencies in a rapid fashion.

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The present invention also describes algorithms for retrieving very low power acknowledgement paging messages in a noisy environment by using data redundancy, data interleaving, soft decoding and error correction codes to strip the bi-phase-modulated, frequency-hopped spread-spectrum digital data transmitted from the remote pocket pagers. A history of the frequency and phase drift is used during reception of the acknowledgement messages to predict the phase and frequency drift of the encoded digital information to further reduce decoding error. Signal to noise ratios are determined for each frequency hop and relatively noisy hops are discarded or minimized in a soft decoding process based redundancy of data bits.

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